Testing Rationale

Antimony Dipentyldithiocarbamate

CAS Registry Number 15890-25-2

August 26, 2005

Summary

The R. T. Vanderbilt Company, Inc. is pleased to submit this test plan for antimony dipentyldithiocarbamate for review and public comment under the Environmental Protection Agency's High Production Volume (HPV) Challenge Program.

Antimony dipentyldithiocarbamate is used as a petroleum extreme pressure and antiwear agent. We propose the following studies to meet the requirements of the EPA High Production Volume Chemical Testing Program:

Physical/chemical properties: No testing proposed

Environmental fate: Biodegradation (OECD 301B)

Environmental toxicity: Chronic daphnia (OECD 211)

Mammalian toxicity: Repeat dose toxicity to rats with reproductive and developmental assessments (OECD 422)

BACKGROUND

Background Information: Manufacturing and Commercial Applications

Manufacturing

This material has been manufactured for over 30 years. It is manufactured by batch rather than continuous process.

Commercial Applications

Antimony dipentyldithiocarbamate is used in industrial applications as an extreme pressure and antiwear agent. This material eliminates the need for supplemental antioxidants.

Shipping/Distribution

Antimony dipentyldithiocarbamate is shipped extensively throughout the world from manufacturing plants located in North America and Western Europe.

Worker/Consumer Exposure

To the best of our knowledge, all of this material is used by the grease and lubricant industry as performance enhancing additive to enhance load-carrying ability of lubricants and greases and to protect lubricant and greases against oxidative degradation. The lubricant and grease industry has a long safety record and only sophisticated producers handle this material. Most large industrial producers have mechanized materials handling systems, so employee exposure is minimal. The greatest potential for skin exposure is at the packing station at the manufacturing site and, to a lesser extent, during weighing activities at the customer site.

Consumer exposure is minimal. Small amounts (less than 5 mass %) are used lubricant and greases. Consumers are typically industrial or commercial end-users and not the general public. The most likely route of end-user exposure is physical contact to finish lubricants and greases.

Background Information: HPV Endpoints

Physical chemical properties

The physical chemical properties of antimony dipentyldithiocarbamate have not been determined. EPIWIN modeling was used to predict boiling point, vapor pressure, and melting point of this material. Antimony dipentyldithiocarbamate is not water soluble, such that determination of the partition coefficient is not applicable. An estimated partition coefficient value is provided. Table 1 presents the physical chemical data for this material.

No additional testing is proposed.

Environmental Fate

This material contains no hydrolysable functional groups (see Figure 1) and as such hydrolysis data are not applicable. The photodegradation half-life was estimated using EPIWIN; the half-life is predicted to be 27 minutes. The biodegradability of the material is not known. Fugacity modeling indicates this material would be found primarily in sediment and soil, which is consistent with its low water solubility. Table 1 presents the environmental fate data for this material.

An OECD 301B ready biodegradability test is proposed.

Environmental Effects

The acute aquatic toxicity of this material is not known. Due to the low water solubility of this material, acute aquatic toxicity is not expected to be relevant.

A chronic toxicity to daphnia is proposed (OECD 211).

Mammalian Toxicity

Table 1 presents the mammalian toxicity data for this material.

Acute Toxicity: The acute oral LD_{50} for antimony dipentyldithiocarbamate is 16,400 mg/kg. The acute dermal LD_{50} is 16,000 mg/kg.

No additional acute toxicity studies are proposed.

Repeated Dose/Reproductive/Developmental Effects: No data were located for repeated dose toxicity of this material. Effects on reproduction and developmental toxicity data were not located.

An OECD 422 (repeat dose toxicity with screening reproductive and developmental toxicity) is proposed.

Genotoxicity: A *Salmonella*/mammalian-microsome plate incorporation mutagenicity assay and an *in vivo* mouse micronucleus assay have been conducted with antimony dipentyldithiocarbamate. The results of the bacterial mutagenicity test were negative; the mouse micronucleus showed weak positive activity.

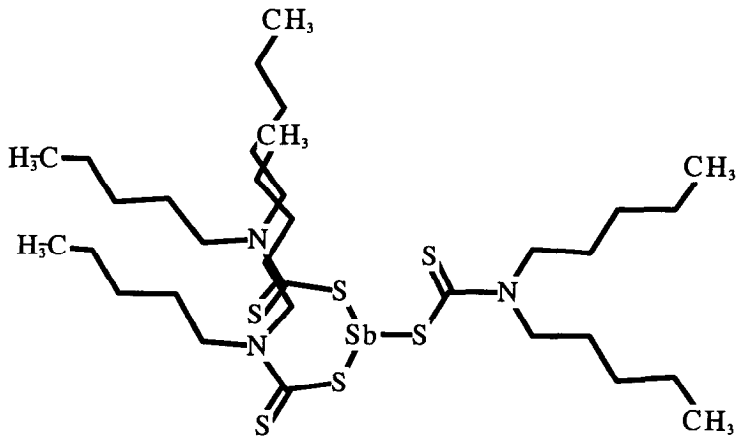
No additional genotoxicity studies are proposed.

Table 1. Matrix of Available and Adequate Data

Test	CAS No. 15890-25-2
Chemical/physical Properties	
Melting Point	345 C (estimated)
Vapor Pressure	2E-19 mm Hg (estimated)
Boiling Point	783 C (estimated)
Partition Coefficient	12.69 (estimated)
Water Solubility	Not soluble (estimated 8.289E-10 mg/L @ 25 C)
Environmental Fate	
Hydrolysis	No hydrolysable functional groups
Photodegradation	t1/2 = 27 minutes
Biodegradation	-
Environmental Transport	Air 0.0652% Water 7.24% Soil 28.5% Sediment 64.2%
Aquatic Toxicity	
Acute Fish	-
Acute Daphnid	-
Algae	-
Mammalian Toxicity	
Acute Oral	16400 mg/kg (rat)
Acute Dermal	16000 mg/kg (rabbit)
Repeated Dose	-
Genotoxicity (*in vitro* -bacteria)	negative
Genotoxicity (*in vivo*)	weak positive
Reproductive/Developmental	-

(-) = No data available or data considered inadequate

Figure 1 Antimony dipentyldithiocarbamate structure



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Test Plan

AUGUST 2005

Physical-Chemical				
Melting Point	**Boiling Point**	**Vapor Pressure**	**Partition Coefficient**	**Water Solubility**
Calc	Calc	Calc	Calc	A

Environmental Fate			
Photodegradation	**Stability in Water**	**Transport/ Distribution**	**Biodegradation**
Calc	NA	Calc	Test

Ecotoxicity			
Acute Toxicity to Fish	**Stability in Water**	**Acute Toxicity to Aquatic Invertebrates (e.g., Daphnia)**	**Chronic Daphnia**
NWS	NWS	NWS	Test

Mammalian Toxicity					
Acute Toxicity	**Bacterial Genetic Toxicity *In Vitro***	**Mammalian Genetic Toxicity *In Vivo***	**Repeat Dose Toxicity**	**Reproductive Toxicity**	**Developmental Toxicity**
A	A	A	Test	Test	Test

Legend	
Symbol	**Description**
Test	Endpoint requirements to be fulfilled with testing
Calc	Endpoint requirement fulfilled based on calculated data
A	Endpoint requirement fulfilled with adequate existing data
NA	Not applicable; no hydrolysable functional groups
NWS	Test not applicable, Test substance is not water soluble